



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Lakin et al.

Serial No.: 10/658,638

Filed: September 9, 2003

Title: Whole-Body Mathematical Model for  
Simulating Intracranial Pressure  
Dynamics

Attorney Docket No.: B02962-00062

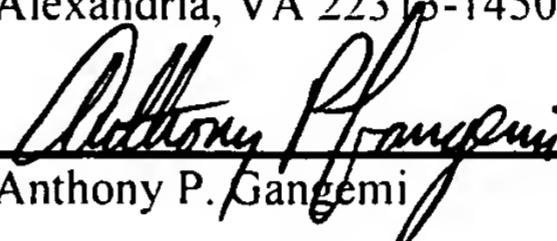
Group Art Unit: 3713

Examiner: Not yet assigned

USPTO Customer No.: 21918

**CERTIFICATE OF MAILING (37 C.F.R. 1.8a)**

I hereby certify that this correspondence is, on the date shown below, being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

 1/20/2004  
Anthony P. Gangemi Date

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

January 20, 2004

**Transmittal of Information Disclosure Statement  
Under 37 C.F.R. §1.97(b)**

In connection with the above-identified application, please find attached an Information Disclosure Statement and copies of all references cited therein.

The Information Disclosure Statement transmitted herewith is being filed before the mailing date of a first Office Action on the merits. Therefore, no fee is due in connection with this submission.

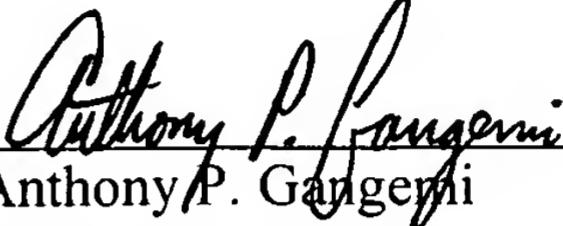
P242-12/00

Law Offices of  
**Downs Rachlin Martin PLLC**  
199 Main Street  
P.O. Box 190  
Burlington, VT 05402-0190  
(802) 863-2375

If any other fee is due with respect to the present application, please charge, or credit any overcharge, to Deposit Account No. 04-1588.

Respectfully submitted,

DOWNS RACHLIN MARTIN PLLC

By: 

Anthony P. Gangemi

Attorney of Record

Registration No.: 42,565

Tel: (802) 863-2375

BTW.257979.1

P242-12/00

Law Offices of  
**Downs Rachlin Martin PLLC**  
199 Main Street  
P.O. Box 190  
Burlington, VT 05402-0190  
(802) 863-2375

FORM PTO-1449 (Modified)

ATTY DOCKET NO.  
02962-00062SERIAL NO.  
10/658,638LIST OF PATENTS AND PUBLICATIONS FOR  
APPLICANT'S INFORMATION DISCLOSURE  
STATEMENT

Page 1 of 2

(Use several sheets if necessary.)

APPLICANT:  
Lakin et al.FILING DATE:  
September 9, 2003GROUP:  
3713

## OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

JAN 22 2004 PATE OIE	AA	Agarwal GC, Berman BM, and Stark LA: A lumped parameter model of the cerebrospinal fluid system. IEEE Trans Biomed Eng 45:53, Jan. 1969
	AB	Albeck MJ, Gjerris F, Sorenson PS, et al: Intracranial pressure and cerebrospinal fluid outflow conductance in healthy subjects. J. Neurosurgery 74:597-600, 1991
	AC	Chemla D, Herbert JL, Coirault C, Zamani K, Suard I, Colin P, and LeCarpentier Y: Total arterial compliance estimated by stroke volume-to-aortic pulse pressure ratio in humans. Am J Physiol 274 (Heart Circ Physiol 43): 500-505, 1998
	AD	Chopp M and Portnoy HD: Systems analysis of intracranial pressure. J Neurosurgery 53:516-527, 1980
	AE	Czosnyka M, Piechnik S, Koszewski W, Laniewski P, Maksymowicz W, Paluszek K, Smielewski P, Zabolotny W, and Zaworski W: The dynamics of cerebral blood perfusion pressure and CSF circulation – a modelling study. In Avezaat et al. (eds.), Intracranial Pressures VIII. Berlin-Heidelberg, Springer, 699-706, 1993
	AF	Czosnyka M, Piechnik S, Richards S, Kirkpatrick P, Smielewski P, and Pickard JD: Contribution of mathematical modelling to the interpretation of bedside tests of cerebrovascular autoregulation. J Neurol Neurosurg Psychiatry 63:721-731, 1997
	AG	Friden H and Ekstedt J: Volume/Pressure relationships of the cerebrospinal space in humans. Neurosurgery 4:351-366, 1983
	AH	Hakim S, Venegas JG, and Burton JD: The physics of the cranial cavity, hydrocephalus and normal pressure: Mechanical interpretation and mathematical models. Surg Neurol 5:187-210, 1976
	AI	Hoffmann O: Biomathematics of intracranial CSF and haemodynamics. Simulation and analysis with the aid of a mathematical model. Acta Neurochir Suppl 40:117-130, 1987
	AJ	Kadas ZM, Lakin WD, Yu J, and Penar PL: A mathematical model of the intracranial system including autoregulation. Neurological Research 19:441-450, 1997
	AK	Karni Z, Bear J, Sorek S, and Pinczewski Z: A quasi-steady state compartmental model of intracranial fluid dynamics. Med Biol Engng Comput 25:167-172, 1987
	AL	Karni Z, Ivan LP, and Bear J: An outline of continuum modelling of brain tissue mechanics. J Child Neuro 1:119-125, 1986
	AM	Lakin WD and Gross CE: A nonlinear haemodynamic model for the arterial pulsatile component of the intracranial pulse wave. Neurol Res 14:219-225, 1992
	AN	Lakin WD, Yu J, and Penar P: Mathematical modeling of pressure dynamics in the intracranial system. Nova Journal of Mathematics, Game Theory and Algebra 5-2, 1996
	AO	Lakin WD, Yu J, and Penar P: Analysis and validation of a mathematical model for intracranial pressure dynamics. Mathematical and Computer Modelling of Dynamical Systems 3:54-73, 1999
	AP	Lewer AK and Bunt EA: Dysfunction of the fluid mechanical cerebrospinal systems as revealed by stress/strain diagrams. S Afr Mech Eng 28:159-166, 1978
	AQ	Miller JD: Volume and pressure in the craniospinal axis. Clin Neurosurg 22:76-105, 1975
	AR	Murgo JP, Westerhof N, Giolma JP, and Altobelli SA: Aortic input impedance in normal man: relationship to pressure wave forms. Circulation 62:105-115, 1980
	AS	Nylin G, Hedlund S, and Regnstrom O: Studies of the cerebral circulation with labeled erythrocytes in healthy man. Circ Res 9:664-674, 1961

EXAMINER

DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 (Modified)

ATTY DOCKET NO.  
02962-00062SERIAL NO.  
10/658,638LIST OF PATENTS AND PUBLICATIONS FOR  
APPLICANT'S INFORMATION DISCLOSURE  
STATEMENTPage 2 of 2  
(Use several sheets if necessary.)APPLICANT:  
Lakin et al.FILING DATE:  
September 9, 2003GROUP:  
3713

## OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

BA	Parazynski SE, Hargens AR, Tucker B, Aratow M, Styf J, and Crenshaw A: Transcapillary fluid shifts in the tissues of the head and neck during and after simulated microgravity. <i>J. Appl. Physiol.</i> 71(6): 2469-2475, 1991
BB	Rekate HL, Brodkey JA, El-Sakka W, and Ko WH: Ventricular volume regulation: a mathematical model and computer simulation. <i>Pediat Neurosci</i> 14:77-84, 1988
BC	Renkin EM, Watson PD, Sloop CH, Joyner WM, and Curry FE: Transport pathways for fluid and large molecules in microvascular endothelium of the dog's paw. <i>Microvasc. Res.</i> 14:205-214, 1977
BD	Sorek S, Bear J, and Karni Z: A non-steady compartmental flow model of the cerebrovascular system. <i>J Biomechanics</i> 21:695-704, 1988
BE	Stevens SA: Mean Pressures and Flows of the Human Intracranial System as Determined by Mathematical Simulations of a Steady-State Infusion Test. <i>Neurological Research</i> , 22:809-814, 2000
BF	Stevens SA, Lakin WD, and Goetz W: A differentiable, periodic function for pulsatile cardiac output based on heart rate and stroke volume. <i>Mathematical Biosciences</i> , 2003 (to appear)
BG	Stevens SA, and Lakin WD: Local Compliance Effects on the Global CSF Pressure-Volume Relationship in Models of Intracranial Pressure Dynamics. <i>Mathematical and Computer Modelling of Dynamical Systems</i> , Volume 6, Number 4:445-465, 2001
BH	Sullivan H, and Allison J: Physiology of cerebrospinal fluid. In: Wilkins R, and Rengachary S, eds. New York: McGraw Hill Book Co. <i>Neurosurgery</i> 3:2125-2135, 1985
BI	Taylor AE, Granger DN, and Brace RA: Analysis of lymphatic protein flux data. I. Estimation of the reflection coefficient and permeability surface area product for total protein. <i>Microvasc. Res.</i> 13:297-313, 1977
BJ	Watenpaugh DE, Breit GA, Ballard RE, Zietz S, and Hargens AR: Vascular compliance in the leg is lower than that in the neck of humans. <i>Medicine and Science in Sports and Exercise (Suppl. 5)</i> :S26(137), 1993

## REFERENCE DESIGNATION

## U.S. PATENT DOCUMENTS

EXAMINERS INITIALS	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPRO.)
BK	5,947,899	9/7/1999	Winslow et al.	600	410	
BL	5,839,438	11/24/1998	Graettinger et al.	128	630	
BM						
BN						
BO						
BP						

EXAMINER

DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

P270 - 02/03  
BTW.257971.1